INSTRUCTION BOOK FOR BRISTOL INSTRUMENTS

BRISTOL

DYNAMASTER STRIP-CHART RECORDER
FOR PHILIPS ELECTRONIC INSTRUMENTS

TYPE NO. 52583/0, 60 CYCLE

Bristol Instruction Manual No. BI2186-I

INSTRUCTIONS

INSTALLATION
OPERATION
& SERVICE

THE BRISTOL COMPANY WATERBURY, CONN. 06720

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PLACE THESE INSTRUCTIONS WITH THE MAN IN CHARGE OF YOUR INSTRUMENTS

I M P O R T A N T

- Read these instructions NOW before installing instrument.
- Keep these instructions permanently & accessibly filed for future reference.
- Be sure to specify MODEL & SERIAL numbers when ordering parts, instructions, diagrams or data.
- Ship instruments or parts for repair or exchange only to Bristol's main or branch factories—not to Sales Offices.
- Be sure to—
  1. Identify your shipments with your exact return address & order number.
  2. Write nearest Bristol Factory or office giving your order number, directions & address for return shipment, full instructions for repair, etc.
- Report damage to shipments at once to shipping company. The **customer assumes responsibility for collecting any claim for damages** from the shipping company, on all shipments made on a collect basis.

FOR LOW COST MAINTENANCE OF YOUR INSTRUMENTS

Completely trained and fully equipped, Bristol Service Engineers will serve you at far less than the cost of maintaining your own staff of instrument specialists.
Experts in their jobs, these engineers provide you with instrument maintenance and repair service. Yet the training and administrative expenses normally associated with these functions are eliminated. To learn more of how these factory trained engineers can save you time, money and trouble contact your nearest Bristol Branch Office or The Bristol Company, Waterbury, Connecticut 06720.

DYNAMASTER STRIP-CHART RECORDER
FOR PHILIPS ELECTRONIC INSTRUMENTS

TYPE NO. 52583/0, 60 CYCLE

Bristol Instruction Manual No. P12186-1

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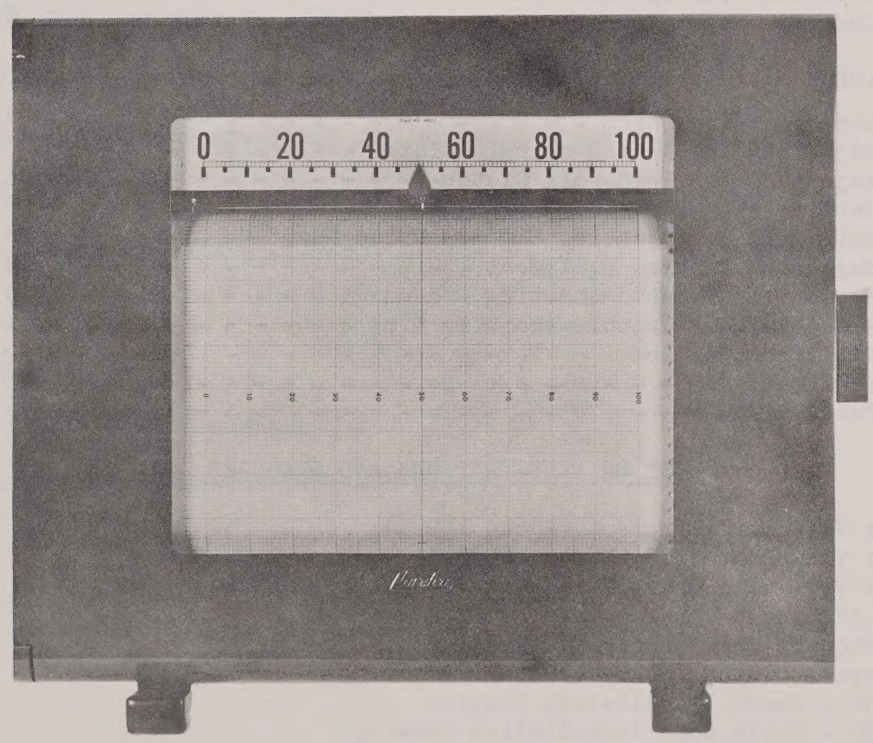

FIGURE 1. FRONT VIEW OF DYNAMASTER RECORDER MODEL PE-1P12H1X560-51

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SPECIFICATIONS

DESCRIPTION - Single Pen Dynamaster Recorder

MODEL NO. - PE-1P12H1X560-51

PEN SPEED - one-half second

CHART DRIVE SPEED - 60 in. per hour (7 1/2, 15 & 30 in./hr. with change gears)

CHART NO.

Linear - Philips Type No. 97000

Logrithmic - Philips Type No. 97001

RANGES - 0-2.5 mv. and 0-10.0 mv.

SUPPLY VOLTAGE - 120 V., 60 cy.

TYPE OF AMPLIFIER - L12X

TYPE OF PENS - Ball Point and capillary

ATTACHMENTS

Range Change Switch

2-Auxiliary Gain Potentiometers

Span and Zero Potentiometers for each Range

Event Pen

Chart Switch

PART I INSTALLATION

A. Unpacking

Do not throw away the packing material until you have found the accessories, such as ink, charts, spare parts, etc.

B. Wiring

Before connecting any wiring to the Dynamaster Recorder, check the voltage and frequency listed on the nameplate of the instrument.

See wiring diagram located in the back of this instruction for instrument wiring.

C. Installing the Chart

A new chart roll must be flush with the left end of its tube. Before installing the chart, tap the left end (end with round holes) on a flat surface to make sure that the tube and chart are flush. Release the chart-plate latch and swing out the chart plate. Fit the new chart roll onto the loading spindles (see sheet 013090) with the round feed holes on the left. Thread the chart over the guide rods and under and around the feed roll. Latch the chart plate and attach the free end of the chart to the rewind tube with the clip provided. Take about 1 1/2 turns around the rewind tube and fit the tube onto the rewind spindles so that the key on the right rewind spindle fits into the slot in the tube. Tighten the chart by turning the rewind-spindle knob counterclockwise.

D. Installing Ball-point Pen

To replace a ball-point pen, remove the cartridge end from the hole in the bracket and unscrew the pen end. Screw in the new pen and place cartridge end in bracket hole.

A ball-point pen should exert a force of approximately 40 to 50 grams on the chart paper for optimum recording results with a wide range of writing velocities. The mounting bracket design for this attachment assures the correct angle and pressure for this pen. The pen mounts perpendicular to the chart paper. The ink supply must always be above the ball point and the bending radius of the cartridge should not be less than 1/2 inch.

E. Filling and Starting Capillary Event Pen

1. On instruments not previously inked.

    a. Remove cap from plastic ink bottle and fill as far as lower end of bottle neck.

    b. After filling ink bottle, replace cap and tighten firmly.

    c. Place index finger of right hand over vent hole in cap and squeeze bottle between thumb and middle finger until a few drops of ink flow freely from pen tip.

    d. Remove finger from vent hole before relaxing pressure on bottle. Do not release suddenly or the ink may be drawn back from the pen tip. The pen is now ready for operation.

2. On instruments being re-inked.

   a. Before removing cap from ink bottle, squeeze the bottle between the thumb and middle finger while the vent hole in the cap is open, then close the vent hole with the index finger and release pressure on the bottle. The ink in the tube will then be drawn back into the bottle. This will prevent dripping when the cap assembly is removed from the bottle and also will prevent air bubbles from forming when the new ink is forced into the tube.

   b. Remove cap and proceed as with steps a, b, c and d of paragraph 1 above.

PART II OPERATION

A. Starting the Dynamaster Recorder

To start the Dynamaster Recorder after it has been properly wired, simply turn on the instrument on-off switch and the chart drive switch. Set pen lifter in down position (see Fig. 2).

B. Stopping the Dynamaster Recorder

For prolonged shutdown, turn instrument on-off switch to the off position and lift pens by moving the pen lifter up (see Fig. 2).

C. Amplifier Gain Adjustment

This instrument has auxiliary gain adjustments for each range. With these adjustments, desired response can be acquired for one range without affecting the other range. When making adjustments the sensitivity will remain fixed when the selector switch is changed to the other position.

As the gain decreases due to aging of the amplifier tubes, it is only necessary to adjust the auxiliary gain controls for proper sensitivity.

The amplifier gain should be checked after changing tubes or doing other service work on the amplifier, and about once every 3 to 6 months thereafter. The reason for the periodic check is because the vacuum tubes age with use. While this check is being made, the measured variable should be at a steady value.

To adjust the gain proceed as follows:

The gain adjustment on the amplifier is factory set to full gain (maximum clockwise rotation) and should not be disturbed by the user. Only the auxiliary gain controls should be used in adjusting the gain for each range. Set range selector switch in the position representing the lowest span in millivolts (X.25). Allow amplifier to warm up for at least 20 minutes.

An input is required from an external source or a test set to provide a step response of approximately full scale.

Adjust the (X.25) gain adjustment so the pen overshoots 0.5% to 0.75% with approximately full scale step change. With any value input, the potentiometer shaft gear should be rotated manually to give an offset of approximately 1% in both directions. When the manual offset is released, the pen should return to within 1/4% of the balance position from either direction.

If the pen does not return within limits, check gain adjustment or for mechanical friction.

On some installations, abnormal pick-up in the external measuring circuit may be present. This pick-up may cause faulty operation.

After the lower range is adjusted, turn range change switch to the (X1.0) position. Adjustment for the (X1.0) range is made similarly to the adjustments for the (X.25) range.

D. Damping Adjustment

The damping adjustment is located in the back of the instrument case.

This control is factory set in a counterclockwise (CCW) position and the amplifier gain adjusted as in paragraph C above. Under these conditions the recorder response is slightly underdamped.

To overdamp the response, turn the damping adjustment in a clockwise (CW) direction the desired amount.

E. Zero Adjustment

Short the input terminals and adjust each range to zero by means of zero pots, see Fig. 3.

F. Span Adjustment

Turn the span adjustment screw clockwise to increase instrument span or turn adjusting screw counterclockwise to decrease instrument span.

Two span pots are provided, one for each range. The pots are identified with the range to which they apply.

G. Reference Voltage Source

The Bristol Zener Diode Reference Voltage Source, is an accurate d-c voltage source with a high degree of stability and reliability. It utilizes Zener diodes as the reference elements in the pre-regulating and output stages of the regulating circuit.

This unit is factory adjusted to produce 1.0190 $\pm$ .001 volts across the bridge circuit. No additional adjustment should be required. If it is desired to check the output voltage, it should be done with the load of the bridge circuit disconnected at the reference voltage source output terminal block, and a load of 339.67 ohms substituted across the terminals as equivalent to the proper bridge load.

The check should be made by balancing against a potentiometric test set. If the voltage is not within tolerance, remove the black snap-in plug in the cover below the nameplate and adjust the potentiometer to produce the correct output voltage. Replace snap-in plug after any adjustment.

H. Changing Chart Speeds

This instrument, when shipped from the factory, is equipped with a 10 rpm Holtzer-Cabot chart drive motor and change gears to provide a 60 inch per hour chart speed. Additional change gears are supplied to provide additional chart speeds of 7 1/2, 15 and 30 inches per hour (see Fig. 3 for location of extra change gears).

To change the chart speed, first remove the change gear lock nuts and change gears from their shafts. See Fig. 2A for location of change gears.

Next, refer to table below for identity of change gears necessary for the desired chart speed.

Chart Speed In/Hr	Gear Position	Pitch	No. of Teeth	Part Number	Lettering Code on Gears
7 1/2	A B	48 48	32 64	79218 79222	K M
15	A B	48 48	48 48	79224 79224	L L
30	A B	48 48	64 32	79222 79218	M K
60	A B	40 40	64 16	92103 92105	H C

The number of teeth and the pitch should be marked on all gears with 32 or more teeth. If two gears with the same number of teeth are not marked for pitch, the smaller one is 48 pitch.

Put the gears on their respective shafts, making sure the "A" gear goes on the lower shaft. Be sure the slots in the gears engage the keys on the hubs so that they will not slip. Lock gears in place with the change-gear nuts. Be sure nuts are tight.

PART III SERVICE

A. Lining up the Chart

It is extremely important that the chart be correctly lined up. This is done very carefully at the Bristol Company Factory and should seldom need adjustment. However, if the left guide pins on the feed roll should tear or distort the holes in the chart, the chart must be realigned as follows:

The center of chart locating pins must be 13/16" from the inside of left chart frame plate. To adjust, loosen chart roll lock nuts on the outside of the plates and relocate to proper position and retighten the lock nuts securely.

If the chart tends to tear on the left side of the holes, loosen setscrew in loading-spindle adjusting nut and turn adjusting nut in a clockwise direction until chart feeds properly. While making this adjustment, hold onto the collar located to the left of and on the same shaft as the adjusting nut. This prevents the shaft from turning while the adjusting nut is being turned.

If the chart tends to tear on the right side of the holes, turn adjusting nut in a counterclockwise direction until chart feeds properly.

If the chart tends to tear on the back side of the holes, the rewind-spindle clutch is too tight. To loosen clutch, turn rewind-spindle clutch plate counter-clockwise (see Fig. 2A). There are 2 holes in this plate into which any small metal object (such as a nail or paper clip can be inserted to turn it. (See Par. D).

B. Adjusting the Rewind-spindle Clutch

If the chart rewind tube slips or rewinds loosely when the Dynamaster Recorder is operating, tighten the rewind-spindle clutch (Fig. 2A) by turning the rewind-spindle clutch plate clockwise. There are 2 holes in this plate into which any small metal object (such as a nail or paper clip) can be inserted to turn it.

C. Adjusting the Feed-roll Clutch

The feed-roll clutch has been carefully installed at the Bristol Factory and generally never requires adjustment. Under unusual operating conditions, however, it may be lose its friction. If it does not feed the chart smoothly at the correct rate, inspect the feed-roll clutch (Fig. 5) for slippage. By removing the rewind roll and turning the feed-roll knob, the clutch tension can be felt. The feed roll should not turn freely. If it does, the clutch is probably slipping.

To tighten the clutch, the entire feed roll must be removed. Take off the feed-roll knob and unscrew the setscrew in the feed-roll sprocket so that the sprocket turns freely. Remove both threaded bushings with their lock nuts, being careful not to lose the bearings. Move the left end of the feed roll out beyond the chart-assembly bracket and withdraw it from the drive sprocket. Push the feed-roll drive shaft through the feed roll until the clutch-spring adjusting nut is accessible. Tighten the adjusting nut until the clutch tension is sufficient to feed the chart correctly. Be sure chart alignment is adjusted as in paragraph B, Part III, Service.

D. Setting the Mechanical Zero

The Dynamaster Wide-strip Recorder is adjusted to have a live zero. The mechanical stop on these instruments will be set so that the pen is mechanically stepped at a point not less than 0.050" below the live zero. This mechanical stop is referred to as the stop bracket in Figure 3.

If it is ever necessary to readjust the mechanical zero, the following procedure should be followed:

Turn off the instrument. Rotate the large drive gear until stop pin hits the low side of stop bracket. If the pen is not at least 0.050" below the live zero, loosen screws holding the stop bracket and shift the bracket sufficiently to permit the pen to be moved to rest 0.050" below the live zero. Retighten screws holding the stop bracket.

E. Replacing or Adjusting the Pen Drive Cord

Refer to sheet 011190.

To replace a broken or worn cord, loosen the drive-cord clamp on the drive-cord sheave, loosen the drive-cord clamp on the pen assembly and take out the old cord.

Turn the drive-cord sheave so that the clamps are at the bottom. Thread one end of the new cord under the left drive-cord clamp and thru the adjusting arbor. Tighten clamp. Thread the cord around the post and the right-hand side of the sheave (in the rear groove), around the left drive-cord pulley, thru the hole in the left-hand scale bracket, thru the hole in the right-hand scale bracket, around the right drive-cord pulley, around the left-hand side of the sheave (in the front groove), around the post, thru the right drive-cord clamp on the sheave. Tighten the clamp. Make sure that the cord is on all the pulleys, then turn the adjusting screw clockwise to tighten the cord to the proper tension. It should be tight enough to prevent backlash but not so tight as to cause the drive-cord pulley to bind. Tighten the left drive-cord clamp and clip off any excess cord which may remain beyond the arbor.

Clamp the pen assembly to the cord when the instrument is in balance position determined by short circuiting the test terminals. This short circuit position is the electrical zero.

F. Suggested Service Equipment

1. Stock of Replacement Parts. It is suggested that the following replacement parts be kept in stock. The vacuum tubes listed below are standard types and are available at any radio supply store:

Type 6EU7 voltage amplifier tube

Type 6BQ5 power amplifier tube

Plug-in-type Electrolytic Filter Capacitor with octal base (10-10-10 mfd. 450 volt)

NOTE: Electrolytic capacitors deteriorate in storage. Their shelf life should not be over 18 months. Replacement electrolytic capacitors can be kept in usable condition indefinitely by placing them in service in the Dynamaster for an hour or two every six months.

Fuses for amplifier (1/8 ampere Littlefuse Slo-Blo)

Amplifier. Where several Dynamaster Recorders are in use or where continuous instrument performance is of critical importance, it is recommended that spare replacement amplifiers be kept in stock.

2. Test Equipment

An a-c voltmeter or test lamp is required to perform the power supply check.

An ohmmeter is convenient when checking the continunity of the measuring circuit.

A potentiometric test set is required (one with ranges 0 to 20 millivolts and 1.019 volts).

G. Systematic Trouble-shooting Procedure

Should the Dynamaster Recorder fail in any way, it is first necessary to determine which part is faulty. The following systematic procedure is suggested in order that repairs may be accomplished with a minimum of lost time and expense.

1. Power-supply Check. Using a 150-volt range a-c voltmeter (or test lamp), check for line voltage across instrument power terminals L1 and L2 on back of case, back of panel and front of panel.

2. Measuring System. The Dynamaster Recorder uses a null-balance type potentiometric circuit. The millivolt input circuit is wired in series with the potentiometer circuit, Syncroverter switch contacts and primary winding of the input transformer. This means that an open circuit anywhere in the measuring circuit, slidewire, Syncroverter switch contacts, or primary winding of the input transformer will produce the same result: no error signal in the circuit and consequently no output from the amplifier to the balancing motor.

Check wiring connections at instrument as well as the millivolt input source. Disconnect input leads and check with a test set at the terminals with 47K ohms in series with the positive (+) lead to be sure that the input source is producing the voltage required for the existing conditions.

CAUTION: Never put an ohmmeter across any part of the measuring system without first disconnecting the input leads to the amplifier. The reason for this is that the ohmmeter produces a relatively high current and would damage the Syncroverter switch contacts.

Assuming that the measuring element and its leads have been eliminated as the source of trouble, proceed as follows:

Check to see that the slidewire brush arm makes good contact with the slidewire (contact pressure is 35-45 grams). Try cleaning slidewire with Bristol cleaning fluid. Allow to dry. Then apply a small amount of Cramolin to slidewire and wipe off excess with a clean lint free cloth.

CAUTION: If any cleaning agent other than Bristol's cleaning fluid is used to clean slidewire, it must be a type that will not leave a residue or one that will not attack varnish.

If the above checks have been performed and the instrument still fails to function, the possible fault may be either an open circuit or a short circuit somewhere in the measuring system. Look for loose or poor connections or possibly a dab of solder that might short out two connections.

3. Balancing Motor Check

CAUTION: Always be sure to turn power switch off before shifting the two control winding wires because of the high voltage across terminals B+ and P.

Turn off instrument power switch. Remove the red and blue control-winding wires from terminals B+ and P and connect them across terminals L1 and L2. Remove black motor lead from L1 and wire a 1-microfarad capacitor in series with it and reconnect to L1. Turn on power switch. The motor should move the pen up or downscale (depending upon phase). Next, turn off power switch and reverse these wires from control winding. The balancing motor should move the pen in the opposite direction. If the balancing motor fails to move the pen up or downscale with the above test, it could mean that one of the following conditions exist.

1. No power to balancing motor

2. Balancing motor defective

3. Mechanical failure between balancing motor pinion, drive gear and recording pen.

NOTE: When test has been completed, be sure to return red and blue wires to their original positions (see wiring diagram) and remove capacitor in series with black wire.

4. Assuming the measuring circuit and the balance motor have been found to operate satisfactory, the trouble is likely to be in the amplifier. Check the voltage and power amplifier tubes, if these are satisfactory replace complete amplifier and return to the Bristol Company for repair.

5. The Recording System. The recording system is mechanical. It includes the chart drive and its gear train, chart feed roll, pen drive cord and associated pulleys, etc.

Check the recording system for mechanical troubles, such as loose or binding gears, pulleys, etc. Move the pen up and downscale manually by turning the balancing motor shaft (with power off). It should move freely from one end of the scale to the other.

Feed the chart manually by turning the feed-roll knob counterclockwise. The tension of the feed-roll clutch should be felt, but the chart should feed straight and smooth without tearing or distorting the holes. The pen should make a clean, legible record.

H. Miscellaneous Trouble-shooting Tips

In general, the following symptoms of troubles described below are caused by definite faults.

For all failures not specifically described below, follow the systematic trouble-shooting procedure outline in paragraph G.

1. Symptom: Pen remains stationary regardless of changes in the value of the measured variable.

Possible faults:

a. Power failure.
b. Defective line fuses.
c. Defective amplifier fuse. An amplifier fuse which burns out repeatedly generally indicates a bad rectifier or plug-in filter capacitor.
d. Defective tube in amplifier.
e. Defective plug-in filter capacitor.
f. Open circuit in measuring element.
g. Syncroverter switch failure.
h. Defective balancing motor.

2. Symptom: Pen records incorrect values.

Possible faults:

a. Excessive spurious voltage in the external measuring circuit.
b. Defective measuring element.
c. Incorrect gain adjustment.

3. Symptom: Chart does not feed properly.

Possible faults:

a. Chart is not lined up properly.
b. Feed-roll clutch is slipping.

4. Symptom: Chart speed is incorrect.

Possible faults:

a. Wrong change gears.
b. Defective chart drive motor.
c. Frequency of power supply incorrect.

I. Amplifier Service

1. D-C Voltmeter Check. A quick method of locating the defective stage is by the use of a d-c voltmeter.

With the amplifier removed from the instrument and a 1000-ohm 10-watt resistor connected across the output terminals of the amplifier and a 120-volt supply connected to power terminals of amplifier, proceed as follows:

a. Turn gain control to zero (extreme counterclockwise position).

b. Connect negative lead of voltmeter to amplifier chassis. Test with the other voltmeter lead at the points listed in following table.

The voltage given in the table were taken with a 20,000 ohm per voltmeter and with a line voltage of 117 volts. If the line voltage is greater or less than 117 volts, the d-c voltage given in the table will vary proportionally. For example: If the line voltage is 110 volts, the voltage at B6 instead of being approximately 300 volts will be $\frac{110}{117} = \frac{X}{300}$ or $X = \frac{110 \times 300}{117} = 282$.

Therefore, the B6 voltage will be approximately 282 volts with a line voltage of 110 volts.

For optimum damping and sensitivity, the voltage between K4 and ground should not vary more than the specified values.

J. Lubrication

No parts require oiling in the Dynamaster Recorder. All bearings are either dry (and should be kept clean) or are permanently sealed and require no lubrication during their normal life.

VOLTAGE CHECKS FOR TYPE L12X AMPLIFIER

MEASURE From	To	CORRECT VOLTAGE	RECOMMENDED CORRECTION IF VOLTAGE IS TOO LOW	IF VOLTAGE IS TOO HIGH
B6	GND	300 ± 10%	Check diodes IN2071 No voltage-replace fuse	Replace V3
B5	GND	295 ± 10%	Check diodes IN2071 Replace plug-in capacitor	Replace V3
B4	GND	260 ± 10%	Check diodes IN2071 Replace plug-in capacitor	Replace V1 or V2
B3	GND	200 ± 10%	Check diodes IN2071 Replace plug-in capacitor	Replace V1 or V2
B1-2	GND	160 ± 10%	Replace plug-in capacitor Check C19	Replace V1
P5	GND	270 ± 10%	Check voltage at B5	Replace V3
P4	GND	225 ± 10%	Check voltage at K4	Check R19
P3	GND	120 ± 10%	Check voltage at K3	Check R15
P2	GND	95 ± 10%	Check voltage at K2	Check R7
P1	GND	95 ± 10%	Check voltage at K1	Check R3
K5	GND	10 ± 10%	Check C14	Check R23
K4	GND	2.75 ± .2V	Check C11 and R19	Check R18
K3	GND	1.1 ± 10%	Check C9	Check R14
K2	GND	.9 ± 10%		Check R6
K1	GND	.9 ± 10%	Check C1	Check R2

K. PARTS LIST

Slidewire	-MP791
Brush Arm	-B1464*
Trimmer (8 ohm)	-95412
Zener Voltage Reference Source	MP-681
Balancing Motor	-MP-678
Balancing motor pinion	-91932
Capacitor (1 mfd - 600 V.)	95698
Type L12X amplifier	AM188*
Input Transformer Unit	~~B2343~~ B3243
Vacuum tube 6EU7	A9675*
Vacuum tube 6BQ5	A10475*
Fuse (1/8 ampere Littlefuse Slo-Blo)	A10485*
Plug-in-capacitor (10-10-10 mfd. 450 V.)	83974 *
Gain control pot	A10979
Ball Point Pen	A8253*
Switch (ON-OFF)	62182
Switch (chart)	62182
Magnet complete for event pen	-A2506
Event pen arm complete	MM1259
Event pen nib	A3129
Capillary tubing	A3123
Ink for event pen (2 oz. bottle red)	A6500*
Ink bottle	A6356
Chart drive motor	-88060
Syncroverter switch	-C1415-2
Potentiometer (2 meg. - auxiliary gain control)	-A12485
Potentiometer (500 ohm for span)	19PP125
Potentiometer (75 ohm for zero)	-19PP132

*Recommended Spare Parts

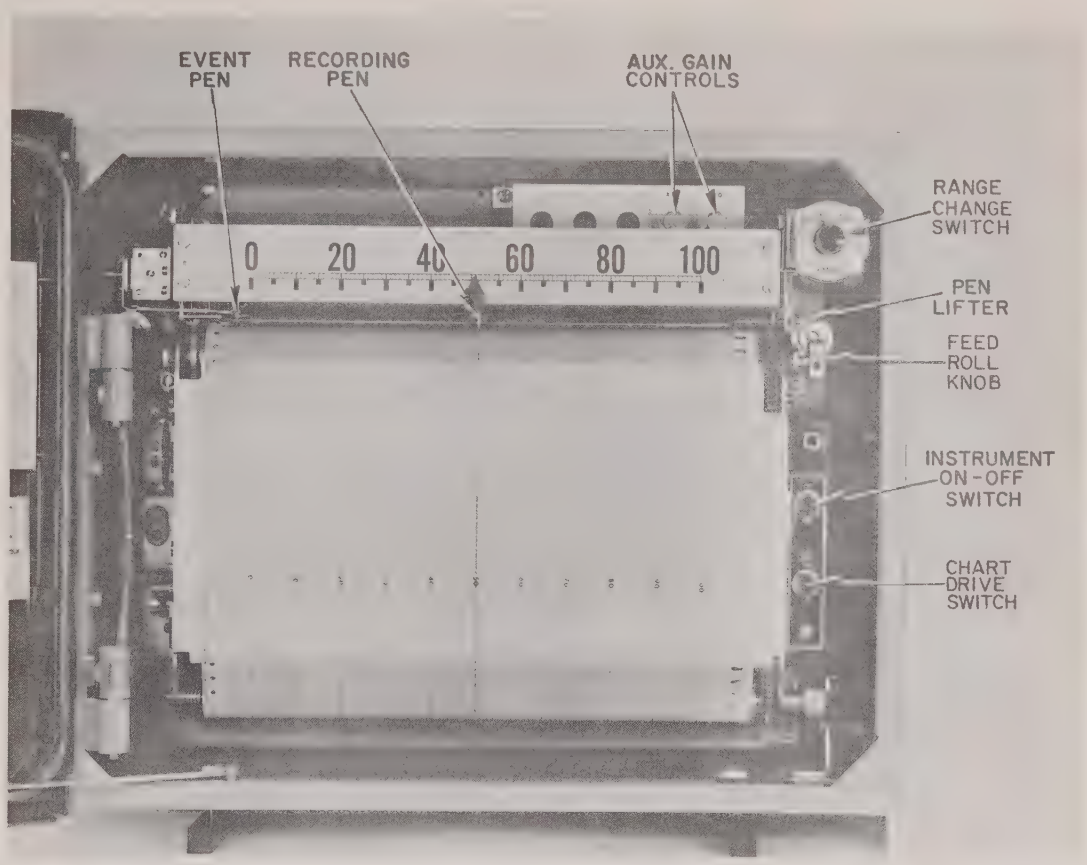


FIGURE 2. FRONT VIEW WITH DOOR OPEN PHOTO 18996-A

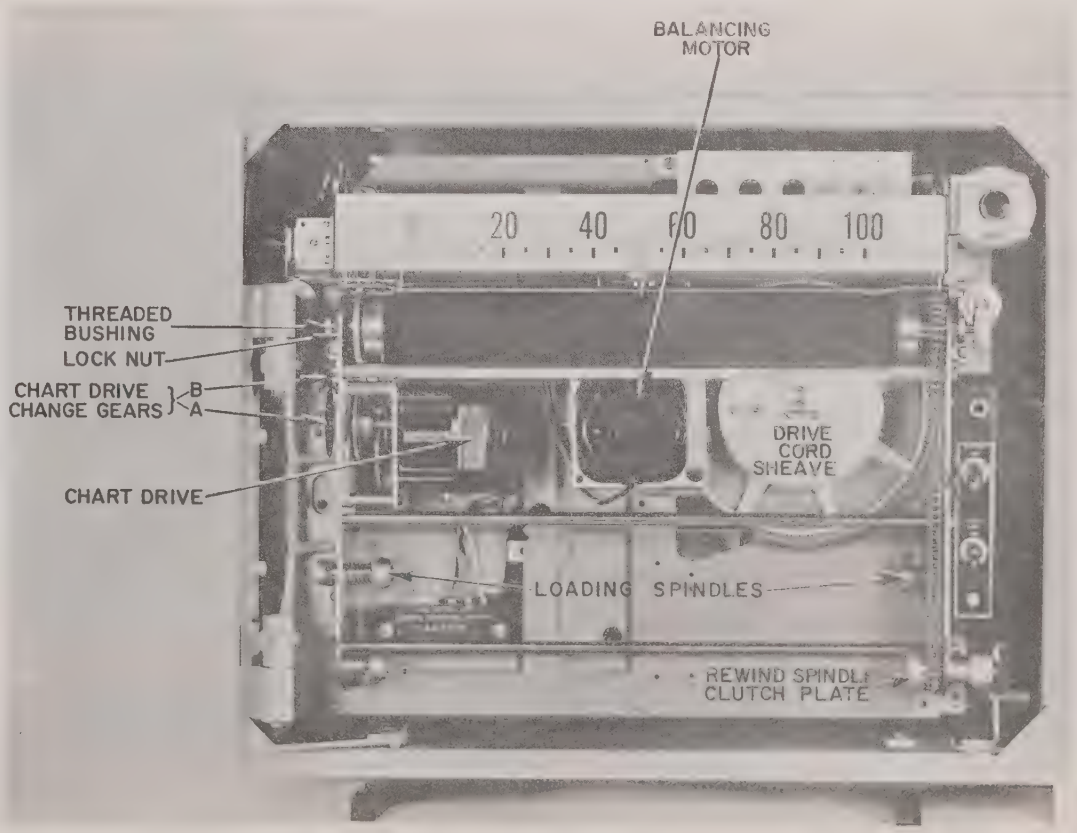


FIGURE 2A. FRONT VIEW WITH CHART PLATE REMOVED PHOTO 18997-A

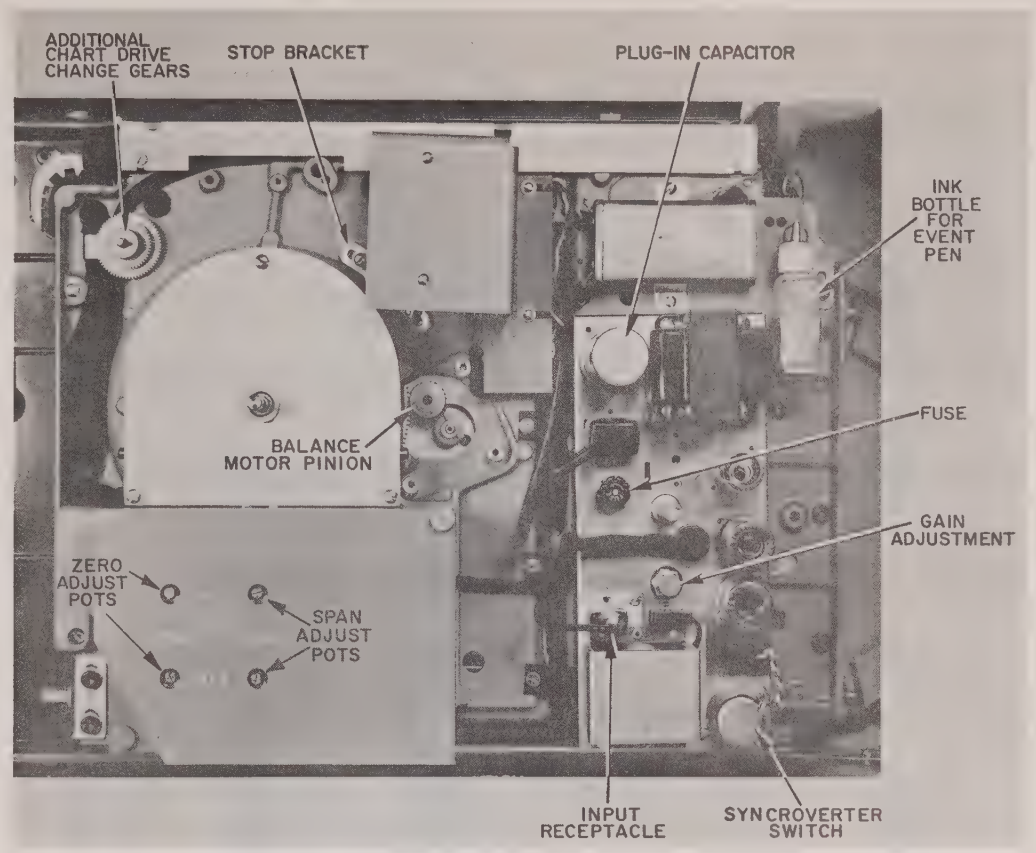


FIGURE 3. REAR OF HINGED PANEL

PHOTO 18998-A

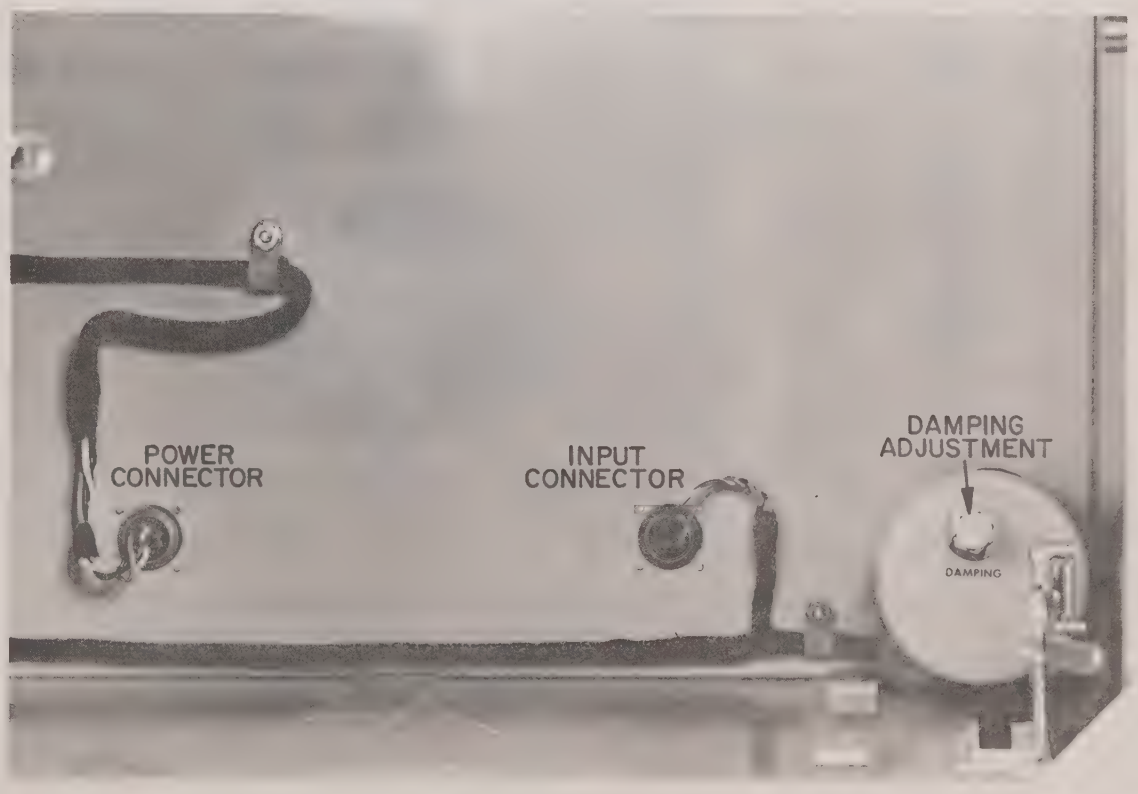


FIGURE 4. INTERIOR OF CASE

PHOTO 18999-A

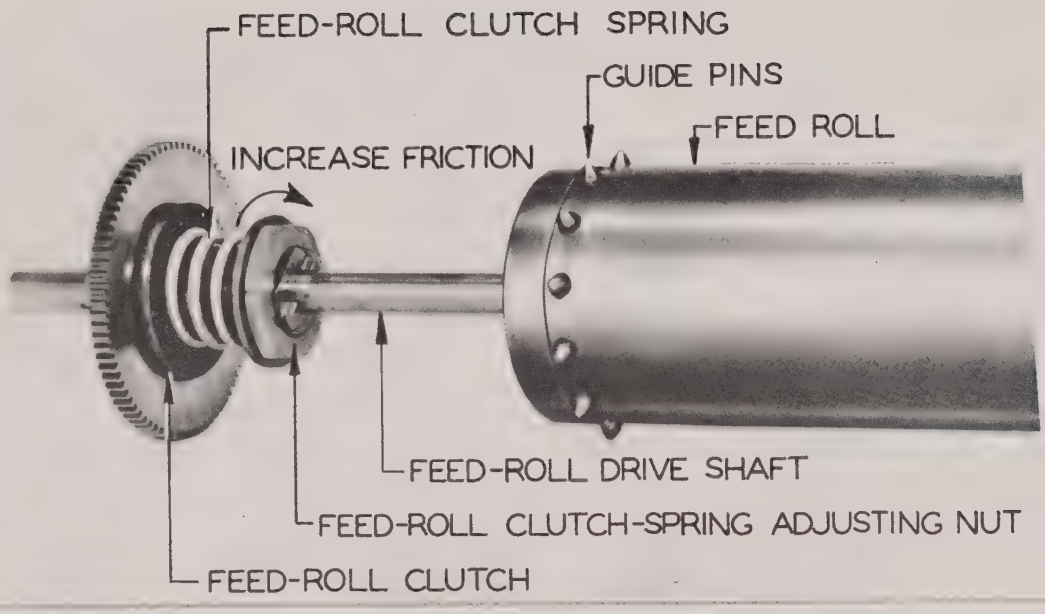
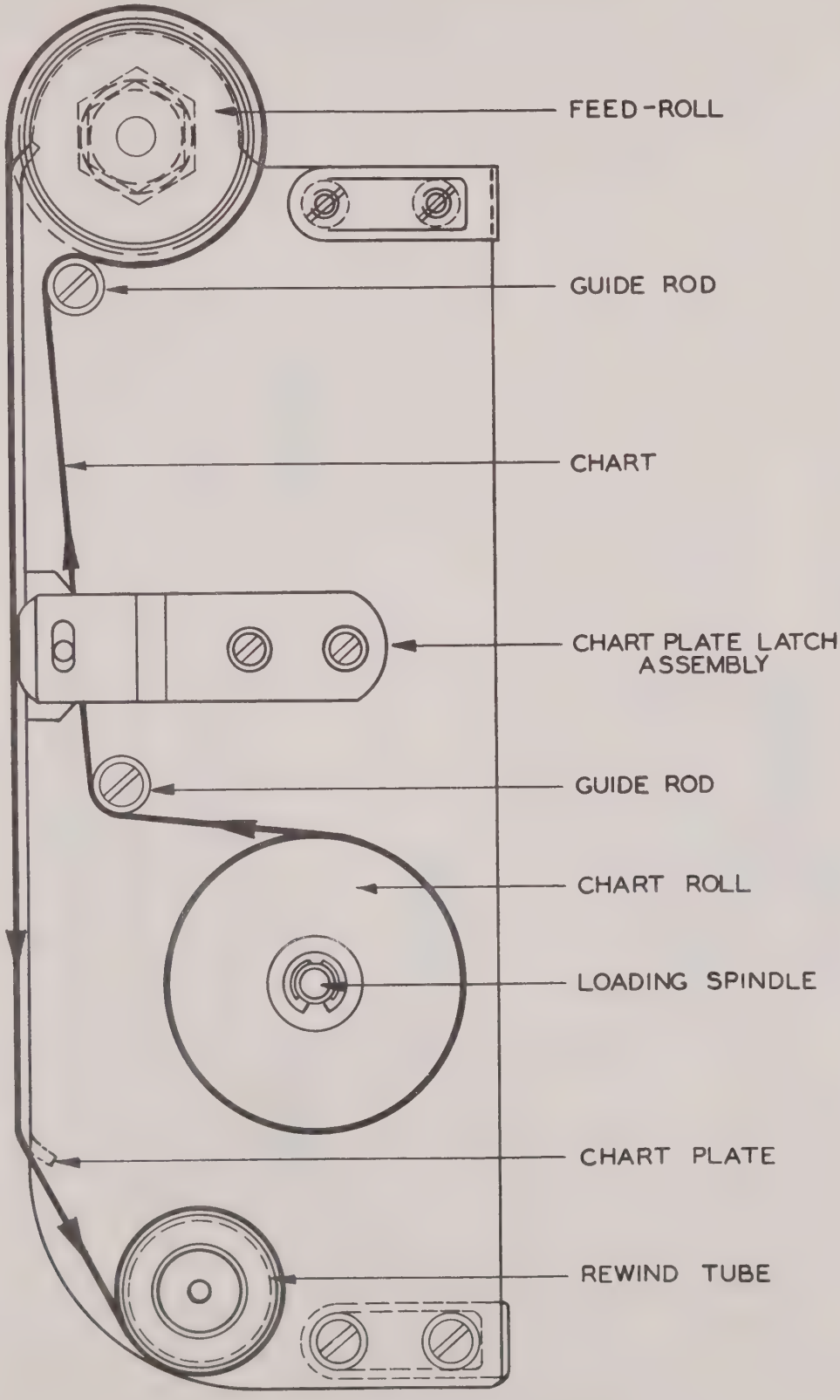
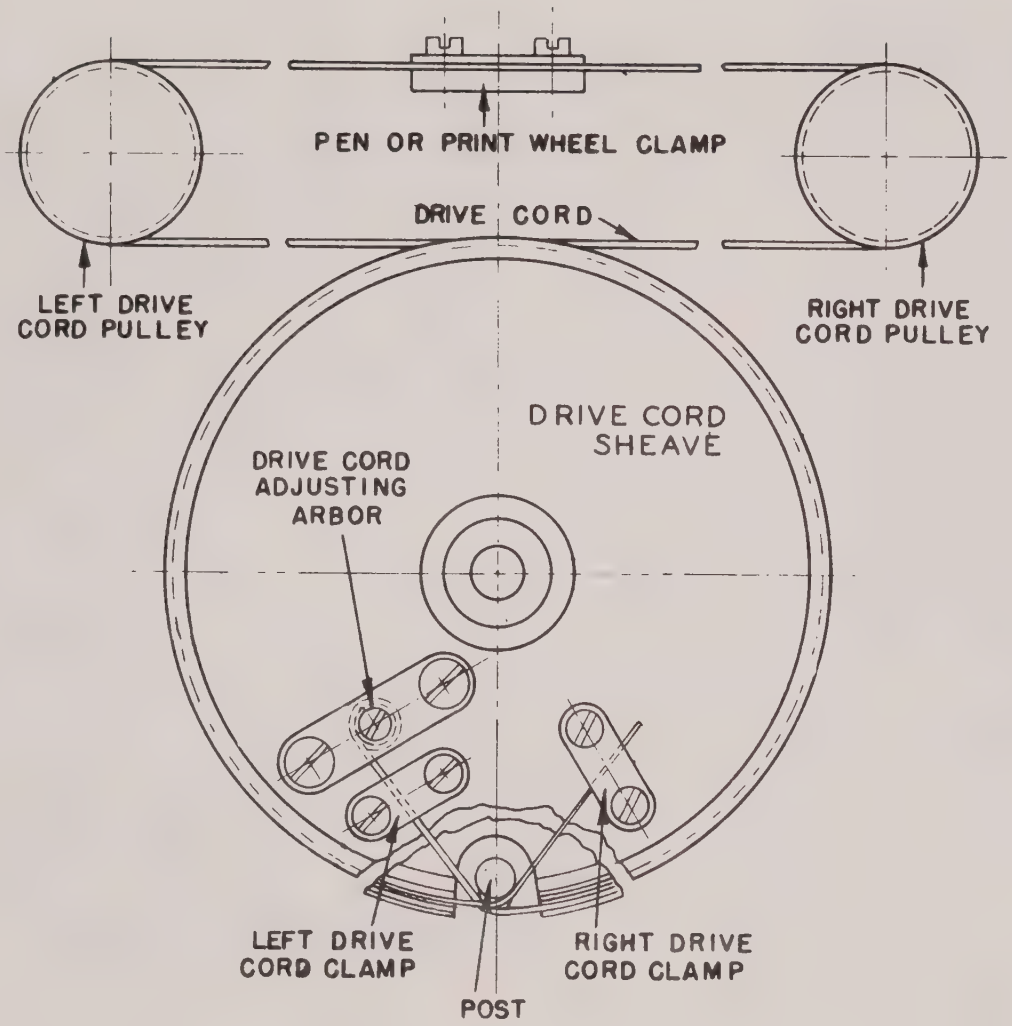


FIG. 5 FEED ROLL CLUTCH PHOTO 13829-A



THE BRISTOL CO.
DRAWN
DRAWER NO 21
013090



DRIVE CORD INSTALLATION DRAWING

THE BRISTOL CO.
WATERBURY, CONN., U. S. A
DATE 4-5-48 DRAWN S. M. B.
DRAWER NO. 21
SHEET NO. 011190

B. CO. ORDER NO. _____ CUSTOMER ORDER NO. _____ SERIAL NO. _____

MISCELLANEOUS

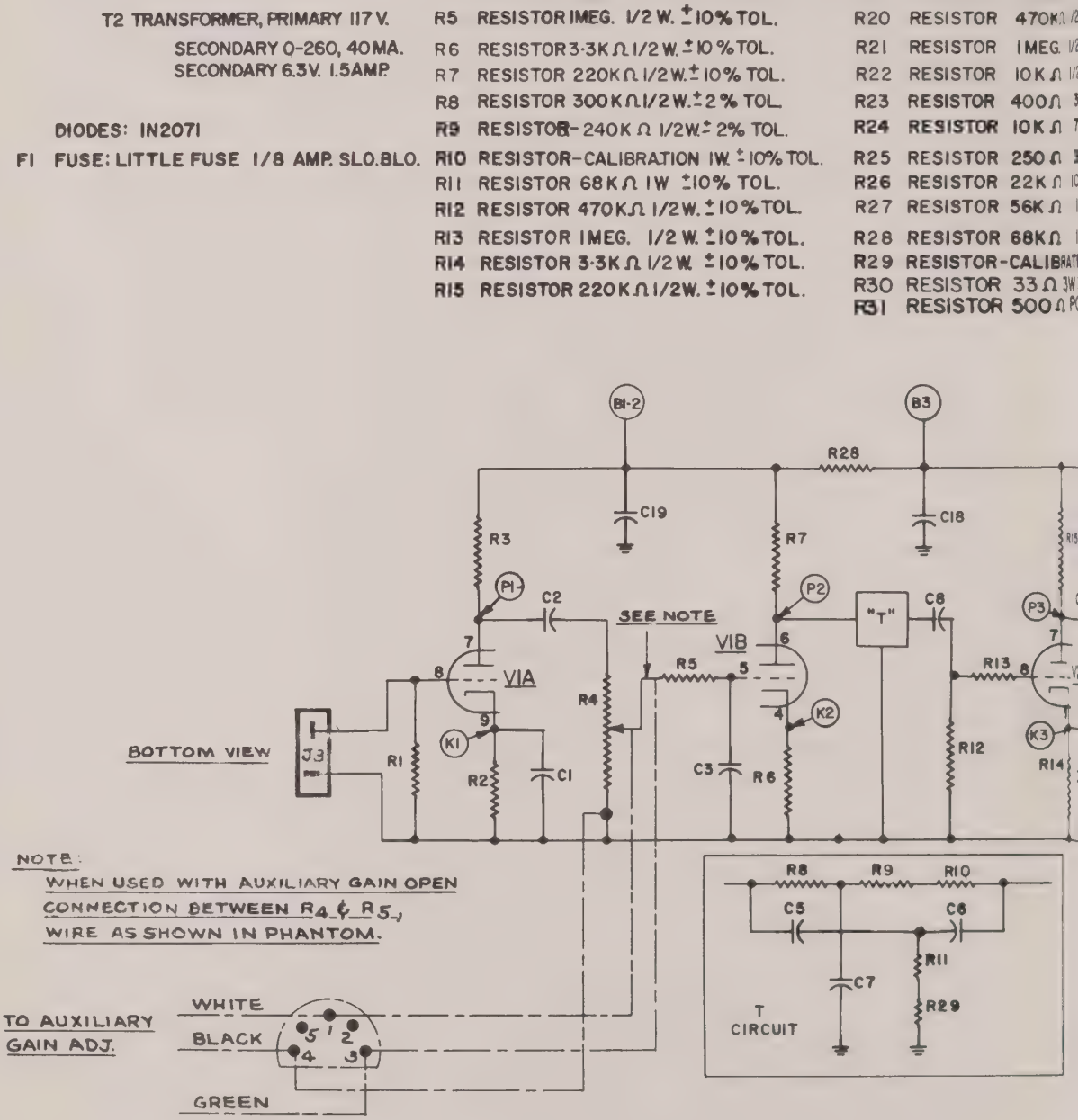
T2 TRANSFORMER, PRIMARY 117 V.
SECONDARY 0-260, 40 MA.
SECONDARY 6.3V. 1.5AMP.

DIODES: IN2071

F1 FUSE: LITTLE FUSE 1/8 AMP. SLO.BLO.

RESISTORS

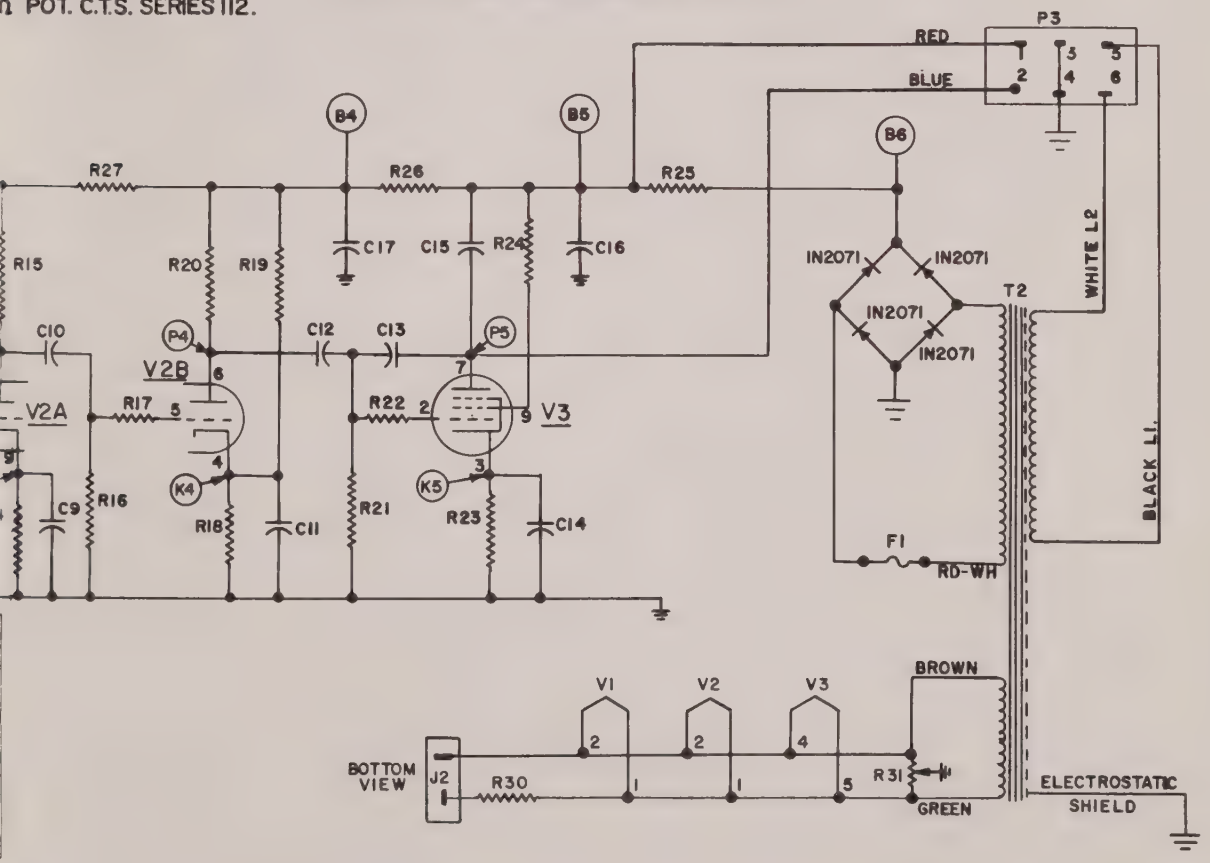
R1 RESISTOR 4.7MEG. 1/2W. ±10% TOL.
R2 RESISTOR 3.3KΩ 1/2W ±10% TOL.
R3 RESISTOR 220KΩ 1/2W ±10% TOL.
R4 RESISTOR 1MEG. POT. CTS. CURVE A.
R5 RESISTOR 1MEG. 1/2W. ±10% TOL.
R6 RESISTOR 3.3KΩ 1/2W. ±10% TOL.
R7 RESISTOR 220KΩ 1/2W. ±10% TOL.
R8 RESISTOR 300KΩ 1/2W. ±2% TOL.
R9 RESISTOR 240KΩ 1/2W. ±2% TOL.
R10 RESISTOR-CALIBRATION 1W. ±10% TOL.
R11 RESISTOR 68KΩ 1W ±10% TOL.
R12 RESISTOR 470KΩ 1/2W. ±10% TOL.
R13 RESISTOR 1MEG. 1/2W. ±10% TOL.
R14 RESISTOR 3.3KΩ 1/2W. ±10% TOL.
R15 RESISTOR 220KΩ 1/2W. ±10% TOL.
R16 RESISTOR 470KΩ 1/2
R17 RESISTOR 1MEG 1/2
R18 RESISTOR 6.8KΩ 1/2
R19 RESISTOR 680KΩ
R20 RESISTOR 470KΩ 1/2
R21 RESISTOR 1MEG. 1/2
R22 RESISTOR 10KΩ 1/
R23 RESISTOR 400Ω
R24 RESISTOR 10KΩ
R25 RESISTOR 250Ω
R26 RESISTOR 22KΩ
R27 RESISTOR 56KΩ
R28 RESISTOR 68KΩ
R29 RESISTOR-CALIBRAT
R30 RESISTOR 33Ω 3W
R31 RESISTOR 500Ω P



SCHEMATIC WIRING DIAGRAM OF SPECIAL

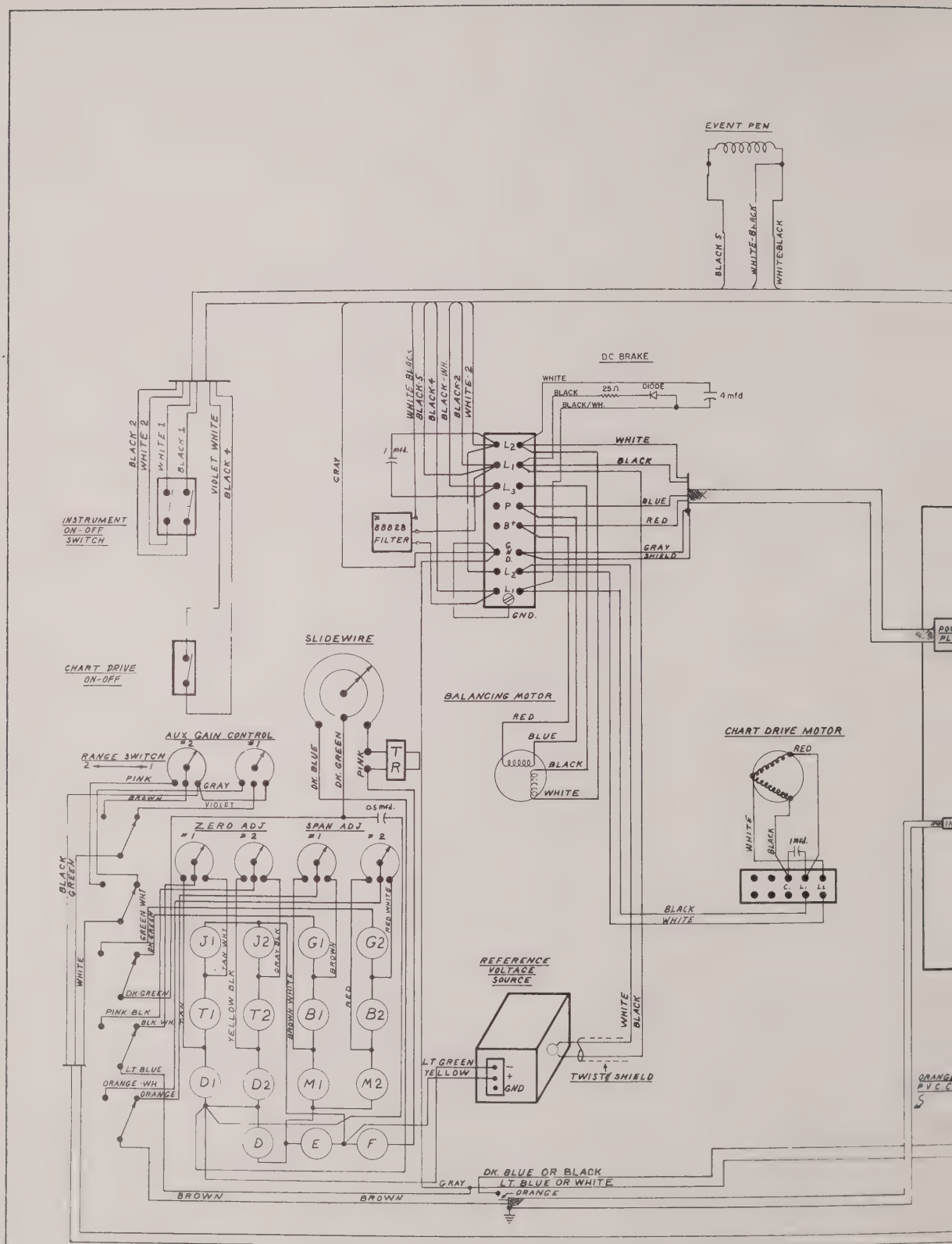
CAPACITORS

Ω 1/2W. ±10% TOL.	C1 CAPACITOR 50 MFD. 15V. (ELEC.) $^{-10}_{+150}$ TOL.	C16	CAPACITOR 10 MFD. 450V. (ELEC.) $^{-10}_{+150}$ % TOL.
G. 1/2W. ±10% TOL.	C2 CAPACITOR .02 MFD. 1000V. (CER.) ±20% TOL.	C17	CAPACITOR 10 MFD. 450V. (ELEC.) $^{-10}_{+150}$ % TOL.
Ω 1/2W. ± 5% TOL.	C3 CAPACITOR 470 MMFD 1000V. (CER.) ±10% TOL.	C18	CAPACITOR 10 MFD. 450V. (ELEC.) $^{-10}_{+150}$ % TOL.
Ω 1W ± 5% TOL.		C19	CAPACITOR 12 MFD. 250V. (ELEC.) $^{-10}_{+150}$ % TOL.
Ω 1/2W. ±10% TOL.	C5 † CAPACITOR .0062 MFD. (MICA) ± 5% TOL.	*	DENOTES SPRAGUE LITTL LYTICS
1/2W. ±10% TOL.	C6 † CAPACITOR .0062 MFD. (MICA) ± 5% TOL.		
1/2W. ±10% TOL.	C7 † CAPACITOR .0062 MFD. (MICA) ± 5% TOL.		**TUBES**
3W. ± 5% TOL.	C8 CAPACITOR .02 MFD. 1000V. (CER.) ±20% TOL.	V1	6EU7 MFG. RCA
7W ± 5% TOL.	C9* CAPACITOR 50 MFD. 15V. (ELEC.) $^{-10}_{+150}$ % TOL.	V2	6EU7 MFG. RCA.
3W ± 5% TOL.	C10 CAPACITOR .02 MFD 1000V. (CER) ±20% TOL.	V3	6BQ5
10W ± 5% TOL.	C11* CAPACITOR 1 MFD. 6V. (ELEC.) $^{-10}_{+150}$ % TOL.	†	C5 C6 & C7 ARE .0075 MFD. FOR 50 CY. AMPLIFIERS
1W ±10% TOL.	C12 CAPACITOR .022 MFD. 600V (PAPER) 10% TOL.		
1W. ±10% TOL.	C13 CAPACITOR .003 MFD. 500V. (MICA) ± 2% TOL.		
RATION 1W. ±10% TOL.	C14 CAPACITOR 50 MFD. 25V. (ELEC.) $^{-10}_{+150}$ % TOL.		
3W ± 5% TOL.	C15 CAPACITOR .25 MFD. 600V. (PAPER) ±20% TOL.		
Ω POT. C.T.S. SERIES 112.			

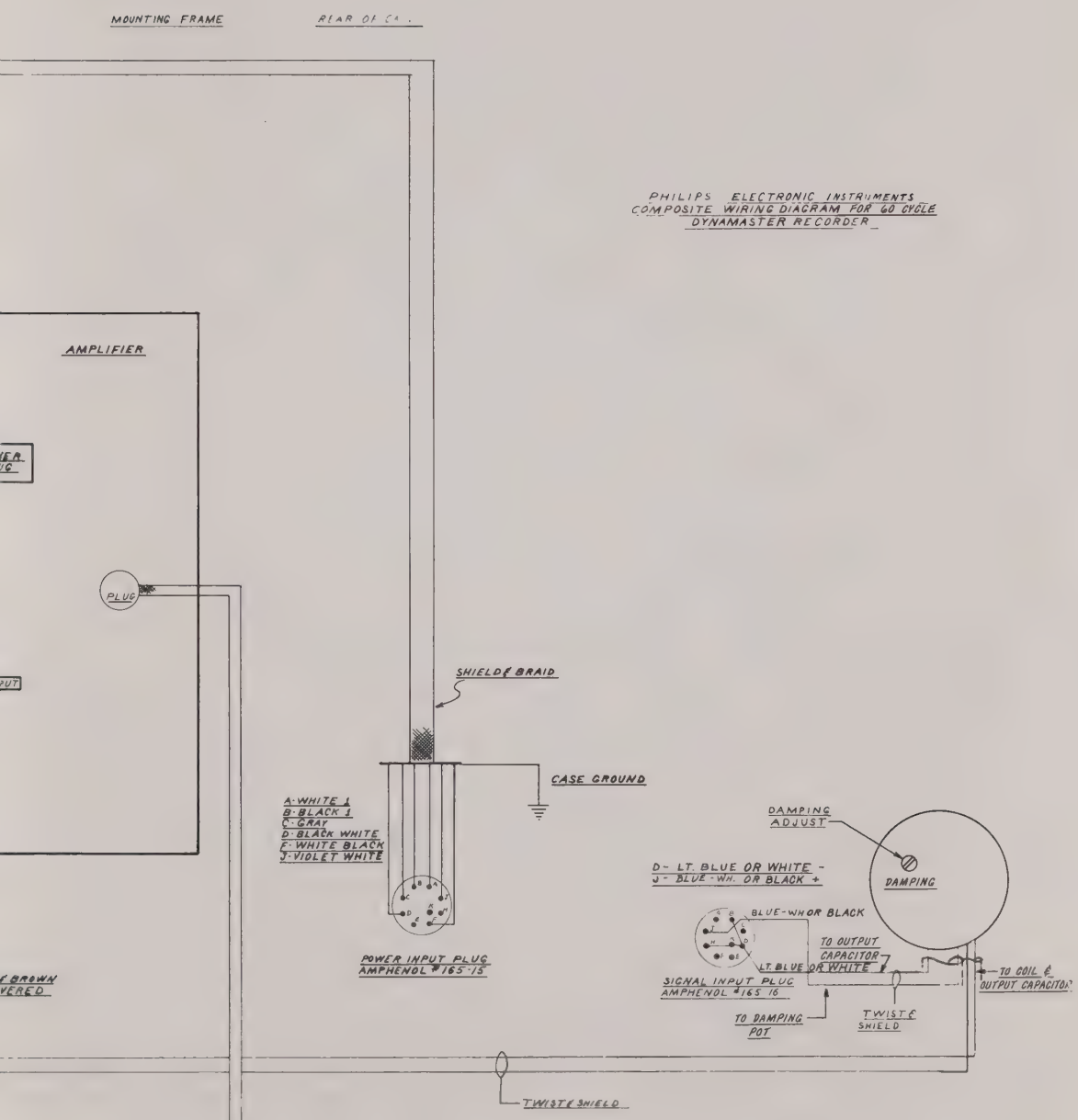


AL PLUG-IN AMPLIFIERS (L12X, L13X)

SHEET NO. 020792
DATE 8/11/64
THE BRISTOL COMPANY
Waterbury, Conn., U.S.A.

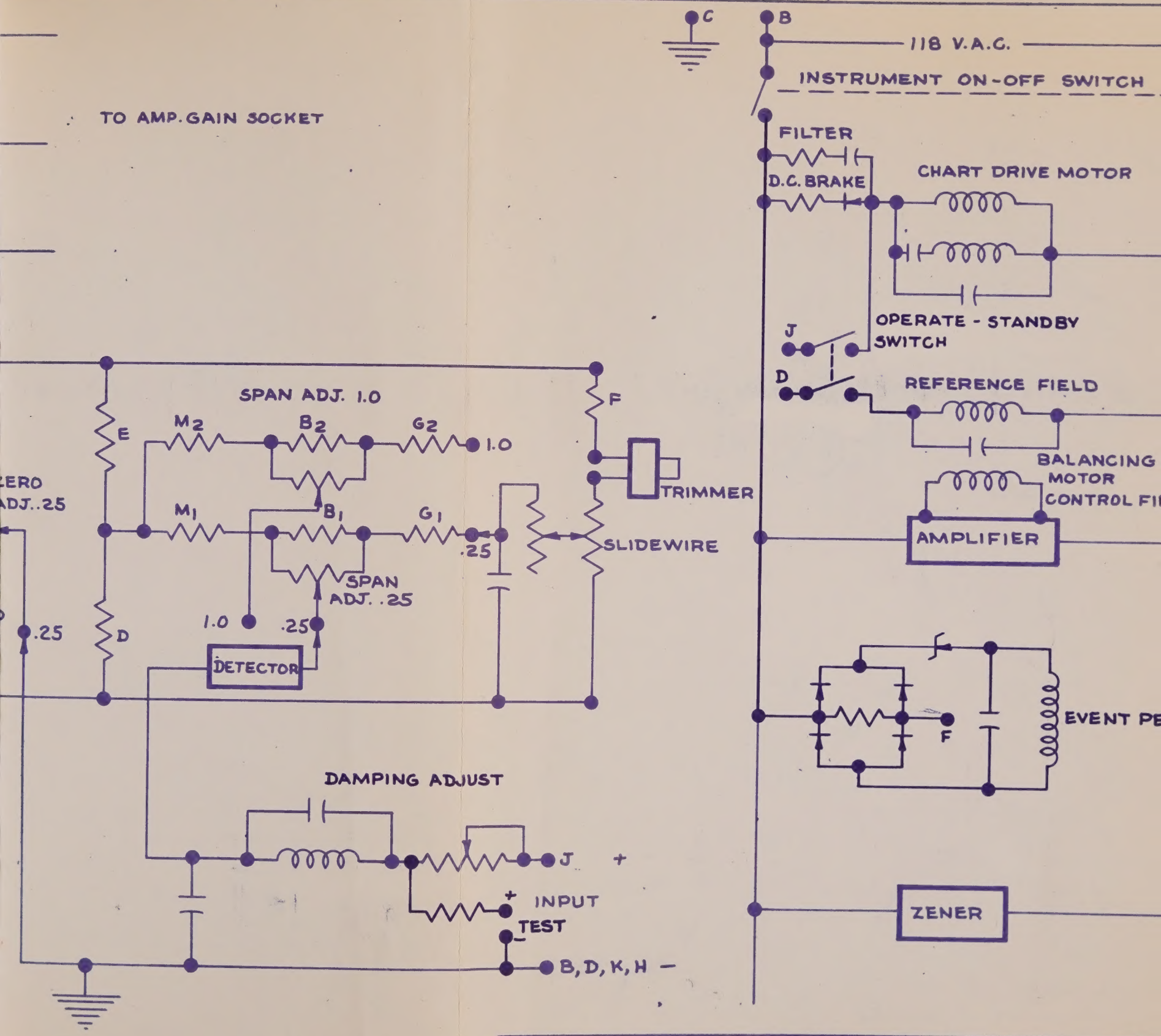


PHILIPS ELECTRONIC INSTRUMENTS COMPOSITE WI



RING DIAGRAM FOR 60 CYCLE DYNAMASTER RECORDER

SHEET NO. 020730
DATE 7/27/64
THE BRISTOL COMPANY
Waterbury, Conn., U.S.A.

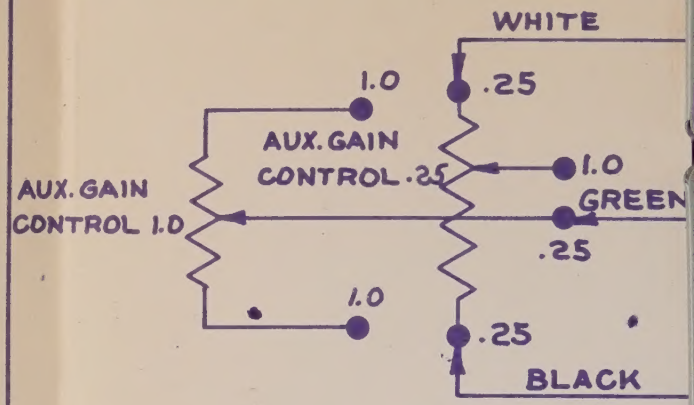


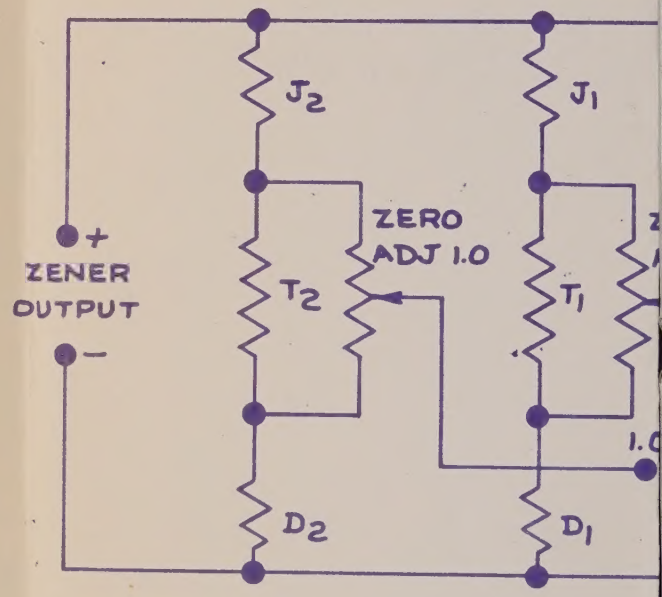
				REVISIONS	

SCHEMATIC FOR PHILIPS ELECTRONIC INSTRUMENTS TYPE 52583/0

THE BRISTOL COMPANY
WATERBURY, CONN. U.S.A.

DRAWN R.A.F.	DATE	
TRACED	CHECKED	
SCALE	FILE D	
NO. 022056-S		


WHITE
1.0
.25
AUX. GAIN
CONTROL .25
1.0
AUX. GAIN
CONTROL 1.0
GREEN
.25
1.0
.25
BLACK


J2
J1
+
ZENER
OUTPUT
ZERO
ADJ 1.0
T2
T1
D2
D1

PRODUCTS OF AMERICAN CHAIN & CABLE COMPANY INC.

INDUSTRIAL SUPPLIES & MACHINERY GROUP

American Welded & Weldless Chain and Attachments, ACCO Registered & Kuplex Sling Chains, Allison Abrasive Cut-Off and Grinding Wheels; Campbell Abrasive Cut-Off Machines; Hydraulic Presses, Nibbling Machines, Punches, Dies; Victor Masonry Cutting Saws and Blades; Malleable Iron Castings; Bristol Socket Screws; Maryland Bolts and Nuts; Weed Tire Chains

WIRE PRODUCTS GROUP

American Cable & Hazard Wire Rope, Wire Rope, Nylon, Dacron & Woven Wire Slings; Page Welding Wire; Strand; Manufacturers Wire; Aluminized Chain Link Fence; Tru-Lay Push-Pull Remote Controls; Automotive and Aircraft Cable Assemblies; Terminals; Tow Lines; SteerMaster Marine Steering Equipment; Clutch and Throttle Controls; Korodless Yacht Rigging

MATERIAL HANDLING GROUP

Mechanical Handling Systems, Automotive Power and Free, Tow Line, and Sortation Systems; Floor Lines and Overhead Trolley Conveyors; Driverless Tractors; Work Carriers and Storage Racks; Louden Monorail Cranes and Systems; Wright Hoists and Cranes; Mansaver Grabs and Custom Engineered Hook Attachments; ACCO Chain, Wire Rope, Nylon, Dacron, and Woven Wire Slings, ACCO Custom Engineered Material Handling Equipment, Wire Rope and Cable Winches

INSTRUMENTS & ELECTRONICS GROUP

Bristol Automatic Controlling, Recording, Electronic and Telemetering Instruments; Syncroverter Choppers; Data-Master Digital and Computing Data Loggers; Solid State Supervisory Control Systems; High Speed Serial-Entry Printers; Electro-Mech Centralized Control and Annunciator Systems; ACCO Gyros, Accelerometers, and other Inertial Equipment; Helicoid Pressure Gages; Wilson "Rockwell" Hardness Testers

INTERNATIONAL GROUP

In Canada DOMINION CHAIN COMPANY Limited, Stratford, Ontario
CANADIAN WARREN PINK division of Dominion Chain Company Limited
St. Catharines, Ontario and Vancouver, British Columbia
THE BRISTOL COMPANY OF CANADA Limited, Toronto, Ontario
CANADIAN MECHANICAL HANDLING SYSTEMS LTD., Windsor, Ontario

In England MHS INTERNATIONAL, Inc., Watford, Herts
PARSONS CHAIN COMPANY Limited
BRITISH WIRE PRODUCTS Limited, Stourport-on-Severn, Worcestershire

In Mexico INSTRUMENTOS BRISTOL, S.A. Mexico 7, D. F.

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